

1 CLAIMS

2 I claim:

3 ^{hus} 1. ^{a3} ~~A yieldable cushioning element comprising:~~

4 a quantity of gel cushioning media formed to have a top, a
5 bottom, and an outer periphery, the cushioning media being
6 compressible so that it will deform under the compressive force
7 of a cushioned object, and

8 a plurality of hollow columns situated in said cushioning
9 media, each of said columns having a longitudinal axis along its
10 length, each of said columns having a column wall which defines a
11 column interior, and each of said columns having a column top and
12 a column bottom;

13 wherein the cushioning element is adapted to have a cushioned
14 object placed in contact with said cushioning element top;

15 wherein the column top and the column bottom of one of said
16 columns are located at two different points on said longitudinal
17 axis of said column;

18 wherein said column's longitudinal axis is located generally
19 parallel to the direction of a compressive force exerted on the
20 cushioning element by a cushioned object in contact with said
21 column top;

22 wherein at least one of said column walls is capable of
23 buckling beneath a protuberance that is located on a cushioned
24 object; and

1 wherein the cushioning element is yieldable as a result of
2 compressibility of said cushioning media and bucklability of said
3 column.

4 2. A cushioning element as recited in claim 1 wherein in
5 at least one of said columns, said column top is open to said
6 column interior.

7 3. A cushioning element as recited in claim 1 wherein in
8 at least one of said columns, said column bottom is open to said
9 column interior.

10 ~~3. A cushioning element as recited in claim 1 wherein in~~
11 ~~at least one of said columns, both said column top and said~~
12 ~~column bottom are open to said column interior.~~

13 4. A cushioning element as recited in claim 3 wherein said
14 column interior is hollow so that air may pass through said column
15 to said column top in order to ventilate a cushioned object in
16 contact with said top of the cushioning element.

17 5. A cushioning element as recited in claim 1 wherein said
18 gel cushioning media is selected from the group consisting of
19 gelatinous elastomers and gelatinous viscoelastomers.

1 6. A cushioning element as recited in claim 1 wherein said
2 gel is non-flowable at normal usable temperatures of the
3 cushioning element.

4 7. A cushioning element as recited in claim 1 wherein said
5 gel cushioning media does not escape from a puncture on said
6 cushioning element.

7 ⁶
8 8. A cushioning element as recited in claim 1, wherein a
9 cross section of one of said columns taken orthogonal to said
10 longitudinal axis of said column has a shape selected from the
11 group consisting of triangular, square, rectangular, pentagonal,
12 heptagonal, octagonal, round, oval, and n-sided polygonal where n
is an integer.

13 ⁷
14 9. A cushioning element as recited in claim 1, wherein a
15 cross section of one of said columns taken orthogonal to said
longitudinal axis of said column is hexagonal.

16 ⁸
17 10. A cushioning element as recited in claim 1 wherein said
18 cushioning element has shape memory so that when a cushioned
19 object is removed from contact with the cushioning element, the
20 cushioning element has a tendency to return to a shape that
approximates the shape of the cushioning element before the

1 cushioning element and the cushioned object came into contact
2 with each other.

3 ⁹
~~11~~. A cushioning element as recited in claim 1 wherein said
4 gel cushioning element is configured to have a low overall
5 thermal mass and a low rate of thermal transfer in order to
6 provide a comfortable cushioning element.

7 ¹⁰
~~12~~. A cushioning element as recited in claim 1 wherein said
8 periphery of the cushioning element has a shape selected from the
9 group consisting of triangular, square, rectangular, pentagonal,
10 hexagonal, heptagonal, octagonal, round, oval, elliptical, heart-
11 shaped, and n-sided polygonal.

12 ¹¹
~~13~~. A cushioning element as recited in claim 1 wherein said
13 cushioning media includes a quantity of gas bubbles within it,
14 said gas bubbles serving to increase the compressibility of the
15 cushioning element.

16 ¹²
~~14~~. A cushioning element as recited in claim ¹¹~~13~~ wherein
17 said gas bubbles are dispersed throughout said cushioning media
18 of the cushioning element.

19 ¹³
~~15~~. A cushioning element as recited in claim ¹¹~~13~~ wherein a
20 plurality of said gas bubbles are present in said column walls,

1 said gas bubbles in said column walls serving to decrease the
2 level of compressive force required to be exerted on a column in
3 order to cause the column to buckle.

4 ¹⁴~~18~~. A cushioning element as recited in claim 1 wherein a
5 plurality of said column walls have openings in them to permit
6 movement of a liquid or gas between adjacent columns.

7 ¹⁵~~17~~. A cushioning element as recited in claim 1 wherein at
8 least one of said columns has a column interior that has a
9 greater radial measurement orthogonal to the longitudinal axis of
10 that column at a first point on the longitudinal axis of the
11 column than at a second point on said longitudinal axis.

12 ¹⁶~~18~~. A cushioning element as recited in claim ¹⁵~~17~~ wherein
13 said column is tapered between said column top and said column
14 bottom.

15 ¹⁷~~19~~. A cushioning element as recited in claim ¹⁵~~17~~ wherein
16 said column is stepped between said column top and said column
17 bottom.

18 ¹⁸~~20~~. A cushioning element as recited in claim 1 wherein in
19 at least one column, said column top and said column bottom are

1 sealed so that said column interior is not in fluid or air
2 communication with a region outside of said column interior.

3 ¹⁹~~21~~. A cushioning element as recited in claim ¹⁸~~20~~ wherein
4 said column interior includes a quantity of fluid cushioning
5 media within it.

6 ²⁰~~22~~. A cushioning element as recited in claim 1 wherein at
7 least one of said columns has a column interior that contains a
8 quantity of foam within it, said foam being selected from the
9 group consisting of open cell foam and closed cell foam.

10 ²¹~~23~~. A cushioning element as recited in claim 1 wherein at
11 least one of said columns has a firmness protrusion located at
12 its column bottom, said firmness protrusion being adapted to
13 provide support within said column when said column buckles so
14 that the cushioning element can readily yield in the vicinity of
15 said column under a cushioned object until the cushioned object
16 begins to compress said firmness protrusion, whereupon said
17 firmness protrusion retards further movement of the cushioned
18 object into the cushioning element.

19 ²²~~24~~. A cushioning element as recited in claim 1 wherein at
20 least one of said columns is adapted to buckle by having a

1 portion of its column wall bulge outward away from the column
2 interior.

23

3 ~~25.~~ A cushioning element as recited in claim 1 wherein at
4 least one of said columns is adapted to buckle by having a
5 portion of its column wall bulge inward toward the column
6 interior.

24

7 ~~26.~~ A cushioning element as recited in claim 1 wherein at
8 least one of said columns is adapted to yield along its
9 longitudinal axis by buckling of its column wall.

25

10 ~~27.~~ A cushioning element as recited in claim 1, wherein the
11 cushioning element has a total volume contained within the
12 boundaries of the cushioning element top, bottom and outer
13 periphery; and wherein said cushioning element total volume is
14 occupied by not more than about 50% by volume of cushioning
15 media.

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16 ~~28.~~ A cushioning element as recited in claim 1 wherein said
17 gel cushioning media is selected from the group consisting of
18 elastomers and viscoelastomers.

27

19 ~~29.~~ A cushioning element as recited in claim ²⁶~~28~~ wherein
20 said gel cushioning media has a Shore A hardness of less than 15.

1 ²⁸
30. A cushioning element as recited in claim ²⁶28 wherein
2 said gel cushioning media has a Shore A hardness of less than 3.

3 ²⁹
31. A cushioning element as recited in claim ²⁶28 wherein
4 said gel cushioning media has a gram Bloom of less than 800.

5 ³⁰
32. A cushioning element as recited in claim ²⁶28 wherein
6 said gel cushioning media comprises a high viscosity triblock
7 copolymer.

8 ³¹
33. A cushioning element as recited in claim ³⁰32 wherein
9 said copolymer has the general configuration of poly(styrene-
10 ethylene-butylene-styrene).

11 ³²
34. A cushioning element as recited in claim ²⁶28 wherein
12 said gel cushioning media comprises about 100 parts by weight of
13 a triblock copolymer and from about 200 to about 1600 parts by
14 weight of a plasticizing oil.

15 ³³
35. A cushioning element as recited in claim ³²34 wherein
16 said copolymer has the general configuration of poly(styrene-
17 ethylene-butylene-styrene).

18 ³⁴
36. ~~A yieldable cushion comprising:~~
 ²⁴

1 a cushioning element having a top, a bottom, a center and a
2 side wall, said cushioning element comprising a quantity of
3 gelatinous cushioning media and a plurality of contiguous,
4 adjacent hollow columns located within said cushioning media,
5 said columns each having a column interior and a column wall,

6 a base configured to be placed in contact with said cushioning
7 element bottom, said base being rigid in order to provide support
8 beneath said cushioning element when a cushioned object is in
9 contact with the cushion such that a compressive force is exerted
10 against said cushioning element top by the cushioned object, and

11 a side wall support, said side wall support being configured to
12 tend to constrain said side wall of said cushioning element from
13 moving outward from said cushioning element center;

14 wherein said cushion is yieldable in response to a compressive
15 force exerted upon it by a cushioned object; and

16 wherein said yieldability of the cushion results from said
17 cushioning media being compressible and from said columns being
18 bucklable, so that the cushion is able to substantially conform
19 to the shape of a cushioned object.

20 ³⁵ 37. A cushion as recited in claim ³⁴ ~~36~~ wherein in at least
21 one of said columns, said column top is open to said column
22 interior.

1 ³⁶~~38~~. A cushion as recited in claim ³⁴~~36~~ wherein in at least
2 one of said columns, said column bottom is open to said column
3 interior.

4 ³⁷~~39~~. A cushion as recited in claim ³⁴~~36~~ wherein in at least
5 one of said columns, both said column top and said column bottom
6 are open to said column interior.

7 ³⁸~~40~~. A cushion as recited in claim ³⁷~~39~~ wherein said column
8 interior is hollow so that air may pass though said column to
9 said column top in order to ventilate a cushioned object in
10 contact with said top of the cushioning element.

11 ³⁹~~41~~. A cushion as recited in claim ³⁴~~36~~ wherein said gel
12 cushioning media is selected from the group consisting of
13 gelatinous elastomers and gelatinous viscoelastomers.

14 42. A cushion as recited in claim 36 wherein said gel is
15 non-flowable at normal usable temperatures of the cushioning
16 element.

17 ~~43. A cushion as recited in claim 37 wherein said gel~~
18 ~~cushioning media does not escape from a puncture on said~~
19 ~~cushioning element.~~

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1 ~~44~~. A cushion as recited in claim ~~36~~, wherein a cross
2 section of one of said columns taken orthogonal to said
3 longitudinal axis of said column has a shape selected from the
4 group consisting of triangular, square, rectangular, pentagonal,
5 heptagonal, octagonal, round, oval, and n-sided polygonal where n
6 is an integer.

7 45. A cushion as recited in claim 36 wherein said
8 cushioning element has shape memory so that when a cushioned
9 object is removed from contact with the cushioning element, the
10 cushioning element has a tendency to return to a shape that
11 approximates the shape of the cushioning element before the
12 cushioning element and the cushioned object came into contact
13 with each other.

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14 ~~46~~. A cushion as recited in claim ~~36~~ wherein said gel
15 cushioning element is configured to have a low overall thermal
16 mass and a low overall rate of thermal transfer in order to
17 provide a comfortable cushioning element.

42 ~~44~~

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18 ~~47~~. A cushion as recited in claim 36 wherein said periphery
19 of the cushioning element has a shape selected from the group
20 consisting of triangular, square, rectangular, pentagonal,
21 hexagonal, heptagonal, octagonal, round, oval, elliptical, heart-
22 shaped, and n-sided polygonal.

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A cushion as recited in claim ~~36~~ wherein said cushioning media includes a quantity of gas bubbles within it, said gas bubbles serving to enhance the compressibility of the cushioning element.

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A cushion as recited in claim ~~48~~ wherein said gas bubbles are dispersed throughout said cushioning media of the cushioning element.

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A cushion as recited in claim ~~49~~ wherein a plurality of said gas bubbles are present in said column walls, said gas bubbles in said column walls serving to decrease the level of compressive force required to be exerted on a column in order to cause the column to buckle.

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A cushion as recited in claim ~~36~~ wherein a plurality of said column walls have openings in them to permit movement of a liquid or gas between adjacent columns.

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A cushion as recited in claim ~~36~~ wherein at least one of said columns has a column interior that has a greater radial measurement orthogonal to the longitudinal axis of that column at a first point on the longitudinal axis of the column than at a second point on said longitudinal axis.

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1 ~~53.~~ A cushion as recited in claim ~~52~~⁴⁷ wherein said column is
2 tapered between said column top and said column bottom.

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3 ~~54.~~ A cushion as recited in claim ~~53~~⁴⁸ wherein said column is
4 stepped between said column top and said column bottom.

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5 ~~55.~~ A cushion as recited in claim ~~36~~³⁴ wherein in at least
6 one column, said column top and said column bottom are sealed so
7 that said column interior is not in fluid or air communication
8 with a region outside of said column interior.

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9 ~~56.~~ A cushion as recited in claim ~~55~~ wherein said column
10 interior includes a quantity of fluid cushioning media within it.

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11 ~~57.~~ A cushion as recited in claim ~~36~~ wherein at least one
12 of said columns has a column interior that contains a quantity of
13 foam within it, said foam being selected from the group
14 consisting of open cell foam and closed cell foam.

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15 ~~58.~~ A cushion as recited in claim ~~36~~ wherein at least one
16 of said columns has a firmness protrusion located at its column
17 bottom, said firmness protrusion being adapted to provide support
18 within said column when said column buckles so that the
19 cushioning element can readily yield in the vicinity of said
20 column under a cushioned object until the cushioned object begins

1 to compress said firmness protrusion, whereupon said firmness
2 protrusion retards further movement of the cushioned object into
3 the cushioning element.

54 34
4 59. A cushion as recited in claim 36 wherein at least one
5 of said columns is adapted to buckle by having a portion of its
6 column wall bulge outward away from the column interior.

54 34
7 60. A cushion as recited in claim 36 wherein at least one
8 of said columns is adapted to buckle by having a portion of its
9 column wall bulge inward toward the column interior.

56 34
10 61. A cushion as recited in claim 36 wherein at least one
11 of said columns is adapted to yield along its longitudinal axis
12 by buckling of its column wall.

57 34
13 62. A cushion as recited in claim 36, wherein the
14 cushioning element has a total volume contained within the
15 boundaries of the cushioning element top, bottom and outer
16 periphery; and wherein said cushioning element total volume is
17 occupied by not more than about 50% by volume of cushioning
18 media.

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1 A cushion as recited in claim ~~26~~ wherein said
2 gelatinous cushioning media is selected from the group consisting
3 of gelatinous elastomers and viscoelastomers.

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4 A cushion as recited in claim ~~36~~ wherein said gel
5 cushioning media has a Shore A hardness of less than 15.

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~~65~~

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6 A cushion as recited in claim ~~36~~ wherein said gel
7 cushioning media has a Shore A hardness of less than 3.

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~~66~~

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8 A cushion as recited in claim ~~36~~ wherein said gel
9 cushioning media has a gram Bloom of less than 800.

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~~67~~

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10 A cushion as recited in claim ~~36~~ wherein said gel
11 cushioning media comprises a high viscosity triblock copolymer.

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~~68~~

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12 A cushion as recited in claim ~~67~~ wherein said copolymer
13 has the general configuration of poly(styrene-ethylene-butylene-
14 styrene).

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~~69~~

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15 A cushion as recited in claim ~~36~~ wherein said gel
16 cushioning media comprises about 100 parts by weight of a
17 triblock copolymer and from about 200 to about 1600 parts by
18 weight of a plasticizing oil.

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1 A cushion as recited in claim 72 wherein said copolymer
2 has the general configuration of poly(styrene-ethylene-butylene-
3 styrene).

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71. ^{as} ~~A yieldable cushion comprising:~~

4 a cushioning element having a top, a bottom, a center and an
5 outer periphery, said cushioning element comprising a quantity of
6 gelatinous cushioning media and a plurality of columns located
7 within said cushioning media, said columns each having a
8 longitudinal axis, a column interior and a column wall,
9

10 a container in which said cushioning element is placeable, said
11 container having a container base configured to be in contact
12 with said cushioning element bottom, said base being rigid in
13 order to provide support beneath said cushioning element when a
14 cushioned object is in contact with the cushion such that a
15 compressive force is exerted against said cushioning element top
16 by the cushioned object, said container also having a rigid outer
17 periphery support, said rigid outer periphery support being
18 configured to provide support to said cushioning element outer
19 periphery in order to impede its tendency to move outward away
20 from said cushioning element center when a cushioned object
21 exerts a compressive force on the cushion,

22 ~~72. A cushion as recited in claim 71~~

1 wherein said cushion is yieldable in response to a compressive
2 force exerted upon it by a cushioned object; and

3 wherein said yieldability of the cushion results from said
4 cushioning media being compressible and from said columns being
5 bucklable generally in the direction of their longitudinal axes,
6 so that the cushion is able to substantially conform to the shape
7 of a cushioned object.

B 8 ⁶⁷
~~73.~~ A cushion as recited in claim ⁷² ~~72~~ wherein in at least
9 one of said columns, said column top is open to said column
10 interior.

B 11 ⁶⁸
~~74.~~ A cushion as recited in claim ⁷² ~~72~~ wherein in at least
12 one of said columns, said column bottom is open to said column
13 interior.

B 14 ⁶⁹
~~75.~~ A cushion as recited in claim ⁷² ~~72~~ wherein in at least
15 one of said columns, both said column top and said column bottom
16 are open to said column interior.

17 ⁷⁰
~~76.~~ A cushion as recited in claim ⁶⁹ ~~75~~ wherein said column
18 interior is hollow so that air may pass through said column to
19 said column top in order to ventilate a cushioned object in
20 contact with said top of the cushioning element.

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72. A cushion as recited in claim 72 wherein said gel cushioning media is selected from the group consisting of gelatinous elastomers and gelatinous viscoelastomers.

78. A cushion as recited in claim 72 wherein said gel is non-flowable at normal usable temperatures of the cushioning element.

~~79. A cushion as recited in claim 73 wherein said gel cushioning media does not escape from a puncture on said cushioning element.~~

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71. A cushion as recited in claim 75, wherein a cross section of one of said columns taken orthogonal to said longitudinal axis of said column has a shape selected from the group consisting of triangular, square, rectangular, pentagonal, heptagonal, octagonal, round, oval, and n-sided polygonal where n is an integer.

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81. A cushion as recited in claim 72, wherein a cross section of one of said columns taken orthogonal to said longitudinal axis of said column has a hexagonal shape.

82. A cushion as recited in claim 72 wherein said cushioning element has shape memory so that when a cushioned

1 object is removed from contact with the cushioning element, the
2 cushioning element has a tendency to return to a shape that
3 approximates the shape of the cushioning element before the
4 cushioning element and the cushioned object came into contact
5 with each other.

74
§ 6 83. A cushion as recited in claim ~~72~~ 66 wherein said gel
7 cushioning element is configured to have a low overall thermal
8 mass and a low overall rate of thermal transfer in order to
9 provide a comfortable cushioning element.

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§ 10 84. A cushion as recited in claim ~~72~~ 66 wherein said periphery
11 of the cushioning element has a shape selected from the group
12 consisting of triangular, square, rectangular, pentagonal,
13 hexagonal, heptagonal, octagonal, round, oval, elliptical, heart-
14 shaped, and n-sided polygonal.

76
§ 15 85. A cushion as recited in claim ~~72~~ 66 wherein said
16 cushioning media includes a quantity of gas bubbles within it,
17 said gas bubbles serving to enhance the compressibility of the
18 cushioning element.

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19 86. A cushion as recited in claim ~~85~~ 76 wherein said gas
20 bubbles are dispersed throughout said cushioning media of the
21 cushioning element.

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1 ~~87.~~ A cushion as recited in claim ~~85~~ wherein a plurality of
2 said gas bubbles are present in said column walls, said gas
3 bubbles in said column walls serving to decrease the level of
4 compressive force required to be exerted on a column in order to
5 cause the column to buckle.

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27 66

B 6 ~~88.~~ A cushion as recited in claim ~~72~~ wherein a plurality of
7 said column walls have openings in them to permit movement of a
8 liquid or gas between adjacent columns.

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27 66

B 9 ~~89.~~ A cushion as recited in claim ~~72~~ wherein at least one
10 of said columns has a column interior that has a greater radial
11 measurement orthogonal to the longitudinal axis of that column at
12 a first point on the longitudinal axis of the column than at a
13 second point on said longitudinal axis.

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14 ~~90.~~ A cushion as recited in claim ~~89~~ wherein said column is
15 tapered between said column top and said column bottom.

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16 ~~91.~~ A cushion as recited in claim ~~89~~ wherein said column is
17 stepped between said column top and said column bottom.

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27 66

B 18 ~~92.~~ A cushion as recited in claim ~~72~~ wherein in at least
19 one column, said column top and said column bottom are sealed so

1 that said column interior is not in fluid or air communication
2 with a region outside of said column interior.

3 ⁸⁴
~~93~~. A cushion as recited in claim ⁸³~~92~~ wherein said column
4 interior includes a quantity of fluid cushioning media within it.

5 ⁸⁵
~~94~~. A cushion as recited in claim ⁸⁶~~72~~ wherein at least one
6 of said columns has a column interior that contains a quantity of
7 foam within it, said foam being selected from the group
8 consisting of open cell foam and closed cell foam.

9 ⁸⁶
~~95~~. A cushion as recited in claim ⁸⁶~~72~~ wherein at least one
10 of said columns has a firmness protrusion located at its column
11 bottom, said firmness protrusion being adapted to provide support
12 within said column when said column buckles so that the
13 cushioning element can readily yield in the vicinity of said
14 column under a cushioned object until the cushioned object begins
15 to compress said firmness protrusion, whereupon said firmness
16 protrusion retards further movement of the cushioned object into
17 the cushioning element.

18 ⁸⁷
~~96~~. A cushion as recited in claim ⁸⁶~~72~~ wherein at least one
19 of said columns is adapted to buckle by having a portion of its
20 column wall bulge outward away from the column interior.

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~~87~~.

A cushion as recited in claim ~~72~~ 66 wherein at least one of said columns is adapted to buckle by having a portion of its column wall bulge inward toward the column interior.

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~~88~~.

A cushion as recited in claim ~~72~~ 66 wherein at least one of said columns is adapted to yield along its longitudinal axis by buckling of its column wall.

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~~89~~.

A cushion as recited in claim ~~72~~ 66, wherein the cushioning element has a total volume contained within the boundaries of the cushioning element top, bottom and outer periphery; and wherein said cushioning element total volume is occupied by not more than about 50% by volume of cushioning media.

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~~90~~.

A cushion as recited in claim ~~72~~ 66 wherein said gel cushioning media is selected from the group consisting of elastomers and viscoelastomers.

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~~91~~.

A cushion as recited in claim ~~72~~ 66 wherein said gel cushioning media has a Shore A hardness of less than 15.

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~~92~~.

A cushion as recited in claim ~~72~~ 66 wherein said gel cushioning media has a Shore A hardness of less than 3.

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77-66

1 ~~103~~. A cushion as recited in claim ~~72~~ wherein said gel
2 cushioning media has a gram Bloom of less than 700.

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77-66

3 ~~104~~. A cushion as recited in claim ~~72~~ wherein said gel
4 cushioning media comprises a high viscosity triblock copolymer.

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5 ~~105~~. A cushion as recited in claim ~~104~~ wherein said
6 copolymer has the general configuration of poly(styrene-ethylene-
7 butylene-styrene).

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77-66

8 ~~106~~. A cushion as recited in claim ~~72~~ wherein said gel
9 cushioning media comprises about 100 parts by weight of a
10 triblock copolymer and from about 200 to about 1600 parts by
11 weight of a plasticizing oil.

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12 ~~107~~. A cushion as recited in claim ~~106~~ wherein said
13 copolymer has the general configuration of poly(styrene-ethylene-
14 butylene-styrene).

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15 ~~108~~. ~~A yieldable cushion comprising:~~

16 a cushioning element having a top, a bottom, a center and a
17 side wall, said cushioning element comprising a quantity of
18 gelatinous cushioning media and a plurality of columns located
19 within said cushioning media, said columns each having
20 longitudinal axis, a column interior and a column wall,

1 a base configured to be placed in contact with said cushioning
2 element bottom, said base providing support beneath said
3 cushioning element when a cushioned object is in contact with the
4 cushion such that a compressive force is exerted against said
5 cushioning element top by the cushioned object, and

6 a cover adapted to cover and protect said cushioning element;

7 wherein said cushion is yieldable in response to a compressive
8 force exerted upon it by a cushioned object; and

9 wherein said yieldability of the cushion results from said
10 cushioning media being compressible and from said columns being
11 bucklable in the direction of their longitudinal axes, so that
12 the cushion is able to substantially conform to the shape of a
13 cushioned object.

100 99
14 ~~109~~. A cushion as recited in claim ~~108~~ wherein said cover is
15 an elastic cover that permits air flow between said cushioning
16 element top and a cushioned object adjacent thereto.

101 99
17 ~~110~~. A cushion as recited in claim ~~108~~ further comprising:
18 a side wall support, said side wall support being configured to
19 tend to constrain said side wall of said cushioning element from
20 moving in an outward direction.

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1 ~~111~~. A cushion as recited in claim ~~108~~ wherein said sidewall
2 support is a rigid plate adapted to be placed between said cover
3 and said cushioning element.

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4 ~~112~~. ^{as} ₂₇ ~~A yieldable cushion comprising:~~

5 a cushioning element having a top, a bottom, a center and an
6 outer periphery, said cushioning element comprising a quantity of
7 gelatinous cushioning media and a plurality of columns located
8 within said cushioning media, said columns each having a
9 longitudinal axis, a column interior and a column wall, and
10 a girdle placeable about said outer periphery of said
11 cushioning element, said girdle serving to retard movement of
12 said outer periphery when a cushioned object exerts a compressive
13 force on the cushioning element,

14 wherein said cushion is yieldable in response to a compressive
15 force exerted upon it by a cushioned object; and

16 wherein said yieldability of the cushion results from said
17 cushioning media being compressible and from said columns being
18 bucklable generally in the direction of their longitudinal axes,
19 so that the cushion is able to substantially conform to the shape
20 of a cushioned object.

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21 ~~113~~. A cushion as recited in claim ~~112~~ wherein said girdle
22 is a strap.

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~~A yieldable cushioning element comprising:~~

a quantity of gel cushioning media formed to have a top, a bottom, and an outer periphery, the cushioning media being compressible so that it will deform under the compressive force of a cushioned object, and

a plurality of hollow columns situated in said cushioning media, each of said columns having a longitudinal axis along its length, each of said columns having a column wall which defines a column interior, and each of said columns having a column top and a column bottom;

wherein the cushioning element is adapted to have a cushioned object placed in contact with said cushioning element top;

wherein the column top and the column bottom of one of said columns are located at two different points on said longitudinal axis of said column;

wherein said column's longitudinal axis is located generally parallel to the direction of a compressive force exerted on the cushioning element by a cushioned object in contact with said column top;

wherein at least one of said columns is capable of buckling beneath a protuberance that is located on a cushioned object;

wherein the cushioning element is yieldable as a result of compressibility of said cushioning media and bucklability of said column;

1 wherein said cushioning media comprises thermoplastic, heat
2 formable and heat reversible gelatinous elastomer composition, G,
3 which is physically interlocked with a selected material Mn, said
4 gelatinous elastomer composition formed from (a) 100 parts by
5 weight of a high viscosity triblock copolymer of the general
6 configuration poly(styrene-ethylene-butylene-styrene); (b) from
7 about 200 to about 1,600 parts by weight of a plasticizing oil;
8 said composition characterized by a gel rigidity of from about 20
9 to about 800 gram Bloom; said composition formed from the
10 combination GnMnGn, MnGnMn, MnGnGn, GnGnMn, MnGnGnMn, GnMnGnGn,
11 GnMnMnGn, GnMnMnGn, GnGnMnMn, GnGnMnGnMn, GnMnGnGn, GnGnMn,
12 GnMnGnMnMn, MnGnMnGnMnGn, GnGnMnMnGn, or GnGnMnGnMnGn, wherein
13 when n is a subscript of M, n is selected from the group
14 consisting of foam, plastic, fabric, metal, concrete, wood,
15 glass, ceramics, synthetic resin, synthetic fibers or refractory
16 materials; and

17 wherein when n is a subscript of G, n denotes the same or a
18 different gel rigidity.

19 ¹⁰⁶
20 ~~115~~. A cushioning element as recited in claim ¹⁰⁵~~114~~ wherein
21 said styrene end block to ethylene and butylene center block
22 ratio is from about 20:80 to about 40:60.

23 ¹⁰⁷
24 ~~116~~. A cushioning element as recited in claim ¹⁰⁵~~114~~, wherein
25 said triblock copolymer is characterized by a Brookfield

Viscosity of a 20 weight percent solids solution in toluene at 25° C. of substantially greater than 1,800 cps.

¹⁰⁸
~~112~~. A cushioning element as recited in claim ¹⁰⁵~~114~~ wherein said cushioning media is a gelatinous elastomer composition comprising:

(a) about 100 parts by weight of a triblock copolymer of the general configuration poly(styrene-ethylene-butylene-styrene) wherein said styrene end block to ethylene and butylene center block ratio is within the range of from between 31:69 to 40:60;

(b) from about 200 to about 1,600 parts by weight of an plasticizing oil selected from the group consisting of petroleum paraffinic oils, petroleum naphthenic oils, synthetic polybutene oils, synthetic polypropene oils, synthetic polyterpene oils and mixtures thereof; said oils having an average molecular weight of between about 200 to about 800; and

(c) said gelatinous elastomer composition being characterized as having an elongation at break of at least about 1,600%, an ultimate tensile strength of at least about 8×10^5 dyne/cm², and a gel rigidity of substantially not greater than about 800 gram Bloom.

¹⁰⁹
~~118~~. A cushioning element as recited in claim ¹⁰⁸~~117~~ wherein said cushioning media exhibits the following properties:

1 (a) tensile strength of about 8×10^5 dyne/cm² to about 10^7
2 dyne/cm² as measured with crosshead separation speed of 25 cm per
3 minute at 23° C.;

4 (b) elongation of about 1,600% to about 3,000% as measured
5 with crosshead separation speed of 25 cm per minute at 23° C.;

6 (c) elasticity modulus of about 10^4 dyne/cm² to about 10^6
7 dyne/cm² as measured with crosshead separation speed of 25 cm per
8 minute at 23° C.;

9 (d) shear modulus of about 10^4 dyne/cm² to about 10^6 dyne/cm²
10 as measured with a 1, 2, and 3 kilogram load at 23° C.;

11 (e) gel rigidity of about 20 gram Bloom to about 800 gram
12 Bloom as measured by the gram weight required to depress a gel a
13 distance of 4 mm with a piston having a cross-sectional area of 1
14 square cm at 23° C.;

15 (f) tear propagation resistance of at least 5×10^5 dyne/cm²
16 as measured at a crosshead separation speed of 25 cm/minute at
17 23° C.;

18 (g) and substantially 100% snap back recovery when extended at
19 a crosshead separation speed of 25 cm/minute to 1,200% at 23° C.

20 ¹¹⁰
~~119~~ A cushioning element as recited in claim ¹⁰⁵~~114~~ wherein
21 said cushioning media is a gelatinous elastomer composition
22 consisting essentially of:

23 (a) about 100 parts by weight of a triblock copolymer of the
24 general configuration poly(styrene-ethylene-butylene-styrene)

wherein said styrene end block to ethylene and butylene center block ratio is about 32:68 to about 38:62;

(b) from about 200 to about 1,600 parts by weight of an plasticizing oil selected from the group consisting of petroleum paraffinic oils, petroleumnaphthenic oils, synthetic polybutene oils, synthetic polypropene oils, synthetic polyterpene oils and mixtures thereof; said oils having an average molecular weight of between about 200 to about 800; and

(c) said gelatinous elastomer composition being characterized as having an elongation at break of at least about 1,600%, an ultimate tensile strength of at least about 8×10^5 dyne/cm², and a gel rigidity of substantially not greater than about 800 gram Bloom.

111 110
~~120~~. A cushioning element as recited in claim ~~419~~ wherein said cushioning media is a gelatinous elastomer composition comprising:

(a) about 100 parts by weight of a triblock copolymer of the general configuration poly(styrene-ethylene-butylene-styrene) wherein said styrene end block to ethylene and butylene center block ratio is about 32:68 to about 36:64;

(b) from about 200 to about 1,600 parts by weight of an plasticizing oil selected from the group consisting of petroleum paraffinic oils, petroleum naphthenic oils, synthetic polybutene oils, synthetic polypropene oils, synthetic polyterpene oils and

1 mixtures thereof; said oils having an average molecular weight of
2 between about 200 to about 800; and

3 (c) said gelatinous elastomer composition being characterized
4 as having an elongation at break of at least about 1,600%, an
5 ultimate tensile strength of at least about 8×10^5 dyne/cm² ,
6 and a gel rigidity of substantially not greater than about 800
7 gram Bloom.

8 ¹¹²
9 ~~121~~. A cushioning element as recited in claim ¹¹¹~~120~~, said
10 cushioning media being a gelatinous elastomer composition
11 comprising:

12 (a) about 100 parts by weight of triblock copolymer of the
13 general configuration poly(styrene-ethylene-butylene-styrene)
14 wherein said styrene end block to ethylene and butylene center
15 block ratio is within the range of from between 31:69 to 40:60;

16 (b) from about 200 to about 1,600 parts by weight of a
17 plasticizing oil;

18 (c) said gelatinous elastomer composition having a gel
19 rigidity of about 20 gram to about 800 gram Bloom.

20 ¹¹³
21 ~~122~~. A cushioning element as recited in claim ¹¹²~~121~~ wherein
22 said plasticizing oil is selected from the group consisting of
23 petroleum paraffinic oils, petroleum naphthenic oils, and
24 mixtures thereof.

114

1 ~~123~~. A cushioning element as recited in claim ~~121~~¹¹² wherein
2 said plasticizing oil is selected from the group consisting of
3 synthetic polybutene oils, synthetic polypropene oils, synthetic
4 polyterpene oils and mixtures thereof.

115

5
6 ~~124~~. A cushioning element as recited in claim ~~121~~¹¹² wherein
7 said plasticizing oil is selected from the group consisting of
8 petroleum paraffinic oils, petroleum naphthenic oils, synthetic
9 polybutene oils, synthetic polypropylene oils, synthetic
10 polyterpene oils and mixtures thereof; said oils having an
11 average molecular weight of between about 200 to about 800.

116

12
13 ~~125~~. A cushioning element as recited in claim ~~121~~¹¹² wherein
14 said oils having an average molecular weight of between about 200
15 to about 800.

117

16
17 ~~126~~. A cushioning element as recited in claim ~~121~~¹¹² wherein
18 said cushioning element exhibits high creep, craze, tear, and
19 crack resistance and is substantially free from oil bleedout.

118

20 ~~127. A yieldable cushioning element comprising:~~

21 a quantity of gel cushioning media formed to have a top, a
22 bottom, and an outer periphery, the cushioning media being
23 compressible so that it will deform under the compressive force
24 of a cushioned object, and

1 a plurality of hollow columns situated in said cushioning
2 media, each of said columns having a longitudinal axis along its
3 length, each of said columns having a column wall which defines a
4 column interior, and each of said columns having a column top and
5 a column bottom;

6 wherein the cushioning element is adapted to have a cushioned
7 object placed in contact with said cushioning element top;

8 wherein the column top and the column bottom of one of said
9 columns are located at two different points on said longitudinal
10 axis of said column;

11 wherein said column's longitudinal axis is located generally
12 parallel to the direction of a compressive force exerted on the
13 cushioning element by a cushioned object in contact with said
14 column top;

15 wherein at least one of said columns is capable of buckling
16 beneath a protuberance that is located on a cushioned object;

17 wherein the cushioning element is yieldable as a result of
18 compressibility of said cushioning media and bucklability of said
19 column;

20 wherein the cushioning media is a gelatinous elastomer
21 composition comprising:

22 (a) about 100 parts by weight of a high viscosity triblock
23 copolymer of the general configuration
24 poly(styrene-ethylene-butylene-styrene);

1 (b) from about 200 to about 1,600 parts by weight of a
2 plasticizing oil; said composition characterized by a gel
3 rigidity of from about 20 to about 800 gram Bloom.

4 119
5 128. ^{a10} ~~A yieldable cushioning element comprising:~~

6 a quantity of gel cushioning media formed to have a top, a
7 bottom, and an outer periphery, the cushioning media being
8 compressible so that it will deform under the compressive force
9 of a cushioned object, and

10 a plurality of hollow columns situated in said cushioning
11 media, each of said columns having a longitudinal axis along its
12 length, each of said columns having a column wall which defines a
13 column interior, and each of said columns having a column top and
14 a column bottom;

15 wherein the cushioning element is adapted to have a cushioned
16 object placed in contact with said cushioning element top;

17 wherein the column top and the column bottom of one of said
18 columns are located at two different points on said longitudinal
19 axis of said column;

20 wherein said column's longitudinal axis is located generally
21 parallel to the direction of a compressive force exerted on the
22 cushioning element by a cushioned object in contact with said
23 column top;

24 wherein at least one of said columns is capable of buckling
25 beneath a protuberance that is located on a cushioned object;

1 wherein the cushioning element is yieldable as a result of
2 compressibility of said cushioning media and bucklability of said
3 column;

4 wherein the cushioning media is a gelatinous elastomer
5 composition comprising:

6 (a) about 100 parts by weight of a high viscosity triblock
7 copolymer of the general configuration
8 poly(styrene-ethylene-butylene-styrene); said styrene to ethylene
9 and butylene is of a ratio of from about 20:80 to about 40:60;
10 and

11 (b) from about 200 to about 1,600 parts by weight of a
12 plasticizing oil; said composition characterized by a gel
13 rigidity of from about 20 to about 800 gram Bloom.

14 ¹²⁰~~129~~. A cushioning element as recited in claim ¹¹⁹~~128~~ wherein
15 said triblock copolymer is characterized by a Brookfield
16 Viscosity of a 20 weight percent solids solution in toluene at
17 25° C. of at least about 1,800 cps.